PHYSICS 20

Intensity ~~assignment~~ WORKSHEET NAME_____

These relationships may help you solve the problems on this sheet.

$$E_1 d_1^2 = E_2 d_2^2 \qquad \frac{I_1}{d_1^2} = \frac{I_2}{d_2^2}$$

1. A street lamp with a luminous intensity of 300 cd is placed 5.00 m above the ground. Find the luminous flux and the illuminance at the ground.
2. What is the illumination 4.00 m from a 100 W bulb that produces 120 cd?
3. It is recommended that the illuminance for newspaper reading be 50.0 lx. How far from a newspaper should a 200 cd source be placed to provide this amount of light?
4. If two 65 cd bulbs are used to replace a 22 cd bulb, how many times will the illumination increase?
5. A 60.0 W bulb located 2.00 m above a table has an efficiency of 1.10 cd/W. Determine the luminous intensity of the bulb and the illumination provided.
6. If a light source at point A, 5.00 m from a screen and another light source of equal intensity is at point 50.0 m away, determine:
   a) which will provide more light.
   b) the ratio of the illuminations.
7. A car, with lights on, approaches a building. The illumination when it was at point A is 16 times the illumination at some other point B.
   a) Which point is closer to the building?
   b) What is the ratio of their distances from the building?
   c) If point A is 20.0 m from the building, what is the distance to point B?
8. The illumination provided by the sun is 10^{11} times greater than that from the nearest star, α-Centauri. If the distance to the sun is 1.49×10^{11}, how far is it to α-Centauri?
9. Two identical candles are placed on either side of a screen. How should they be placed to provide equal illumination?
10. It is found that a 40.0 cd source placed 3.00 m from a screen provides the same illumination as an unknown source placed 1.20 m from the screen. What is the intensity of the unknown source?
11. A 20.0 cd source placed 1.00 m from a light meter gives the same illumination as an unknown source placed 2.50 m from the meter. Determine the intensity of the second source.
12. The illumination thrown on a screen by two sources of light is equal when the distances between the sources and the screen is 4.00 m and 5.00 m respectively. If the intensity of one source is 30.0 cd, what is the intensity of the second source?
13. When an unknown light bulb was compared with a standard light bulb it was found that the unknown gave equal illumination when it was 30.0 cm from the detector and the standard bulb was 120 cm from the detector. What was the ratio of the intensities?
14. Two identical candles are placed on either side of a screen. If the illumination on side A is to be 4 time the illumination on side B, name two possible locations (distances) for candle A and the corresponding distances to candle B.
15. Two bulbs known to have the same intensity but one appears to be 144 times brighter. If the bright light is 1.50 m away, where is the other light?
16. Two lights are placed on opposite sides of a screen. If source A is placed 5.00 m from the screen and source B is placed 3.00 m from the screen they provide equal illumination. What is the ratio of the intensities of the sources?

17. Two lights that provide equal illumination on a screen have a distance ratio of 10 to 1. If the brighter bulb has an intensity of 5.0 cd, what is the intensity of the second bulb?
18. If a 10.0 cd light and a 15.0 cd light are placed to provide equal illumination on a screen, what is the ratio of their distances?
19. A lamp provides an illumination of 528 lx at a distance of 3.60 m. What is the illumination at 7.20 m?
20. A lamp provides an illumination of 36.4 lx at a distance of 95.0 m. Calculate the illumination at 31.0 m.
21. A light with an intensity of 15.0 cd is placed 2.50 m from a screen. Where would a 5.00 cd light need to be placed to provided the same illumination?
22. A car headlight provides an illumination of 968 lx at a distance of 14.3 m. Calculate the distance at which the illumination will be 322.6 lx.
23. A flashlight provides an illumination of 315 lx at a distance of 2.90 m. Calculate the distance at which the illumination is 583 lx.
24. Two lights are selected to provide the same illumination at a light meter. One bulb is 20.0 cd and is placed 2.00 m from the screen. If the other bulb is 4.00 m from the screen, what is its intensity?
25. A lamp provides an illumination of 480 lx at a distance of 16.4 m. Calculate the illumination at 4 times the distance.
26. A lamp with an intensity of 12.0 cd is placed 4.00 m from a meter. How intense a bulb would need to be placed at a distance of 16.0 m to double the illumination?
27. A lamp provides an illumination of 18.36 lx at 294 m. Calculate the distance at which the illumination will be doubled.
28. On light is 4 times as far away as another identical light. If the brightest light provides an illumination of 185 lx, what is the illumination of the more distant light.
29. On star is 3.60×10^4 times as bright as a similar, ~~more distant~~, star. If they provide equal illumination at the earth and the brightest star is 4.20 light years away, calculate the distance to the more distant star.
30. Two identical stars have intensity readings in a ratio of 40 to 1.0. Calculate the ratio of their distances.
31. Tow similar lights are at distances in a ratio of 8.00 to 785. Calculate the ration of their intensities.
32. A screen is placed between two identical lights so the ratio of the illuminations produced on a screen is 4.0 to 1.0. If the lights are 100.0 cm apart, calculate the position of the screen.
33. Two lights with intensities in a ratio of 16.0 to 1 are placed 200 cm apart. If they are to provide equal illumination where should the screen be placed?
34. A screen is placed on a line connecting two identical lights and the screen. The screen is to the right of the two lights and the lights are 180 cm apart. If the illumination provided by the closer light is 6.0 times more than the distant light, calculate the screen position.